Regular Edition

THE CANADIAN ARCHITECT AND BVILDER

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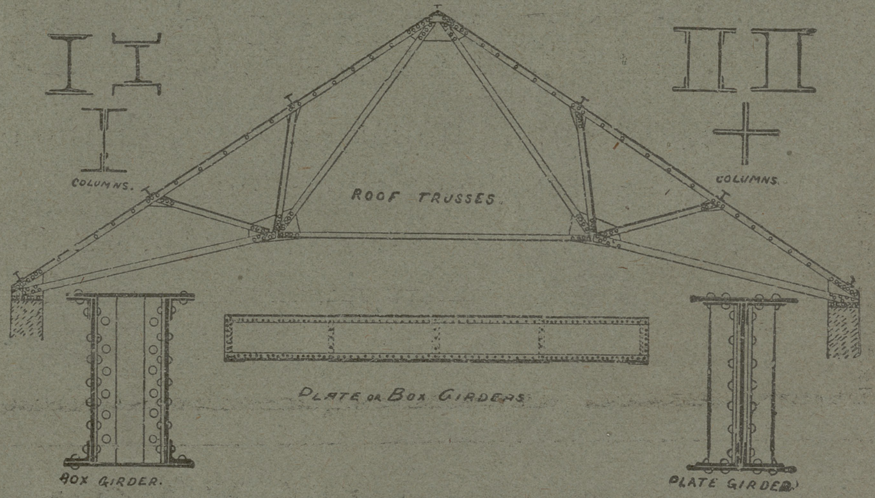

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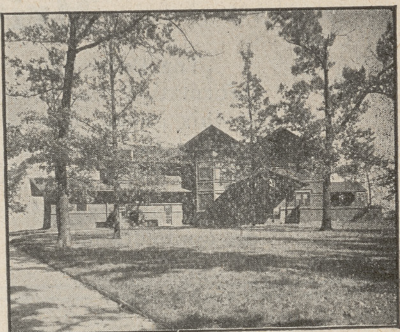

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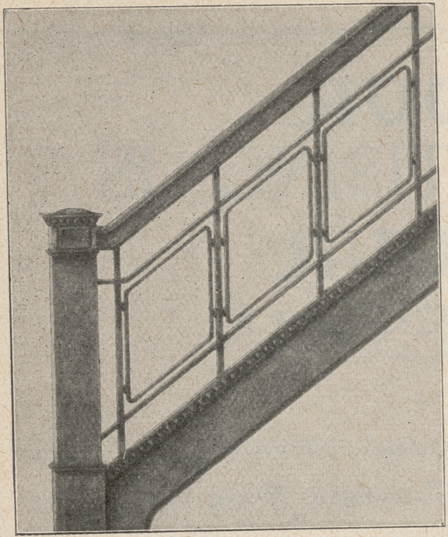

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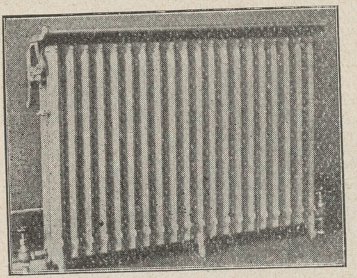

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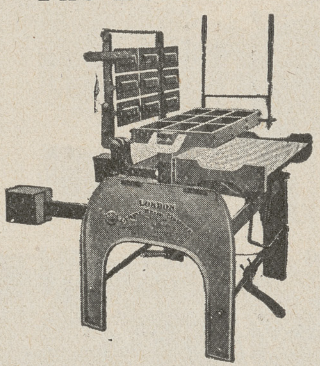

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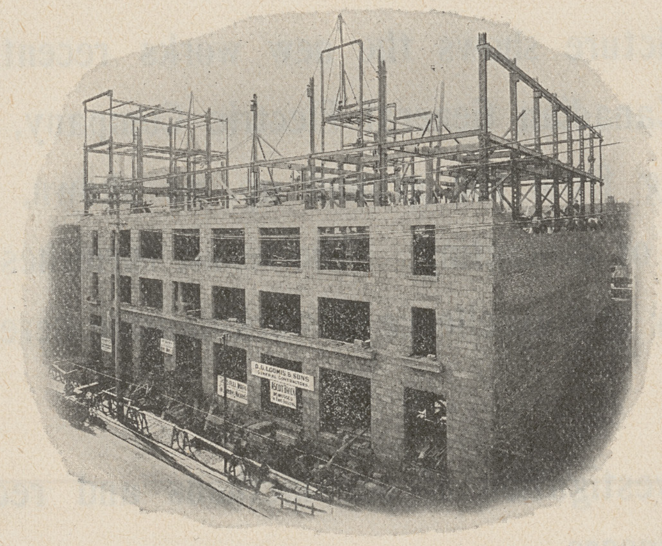

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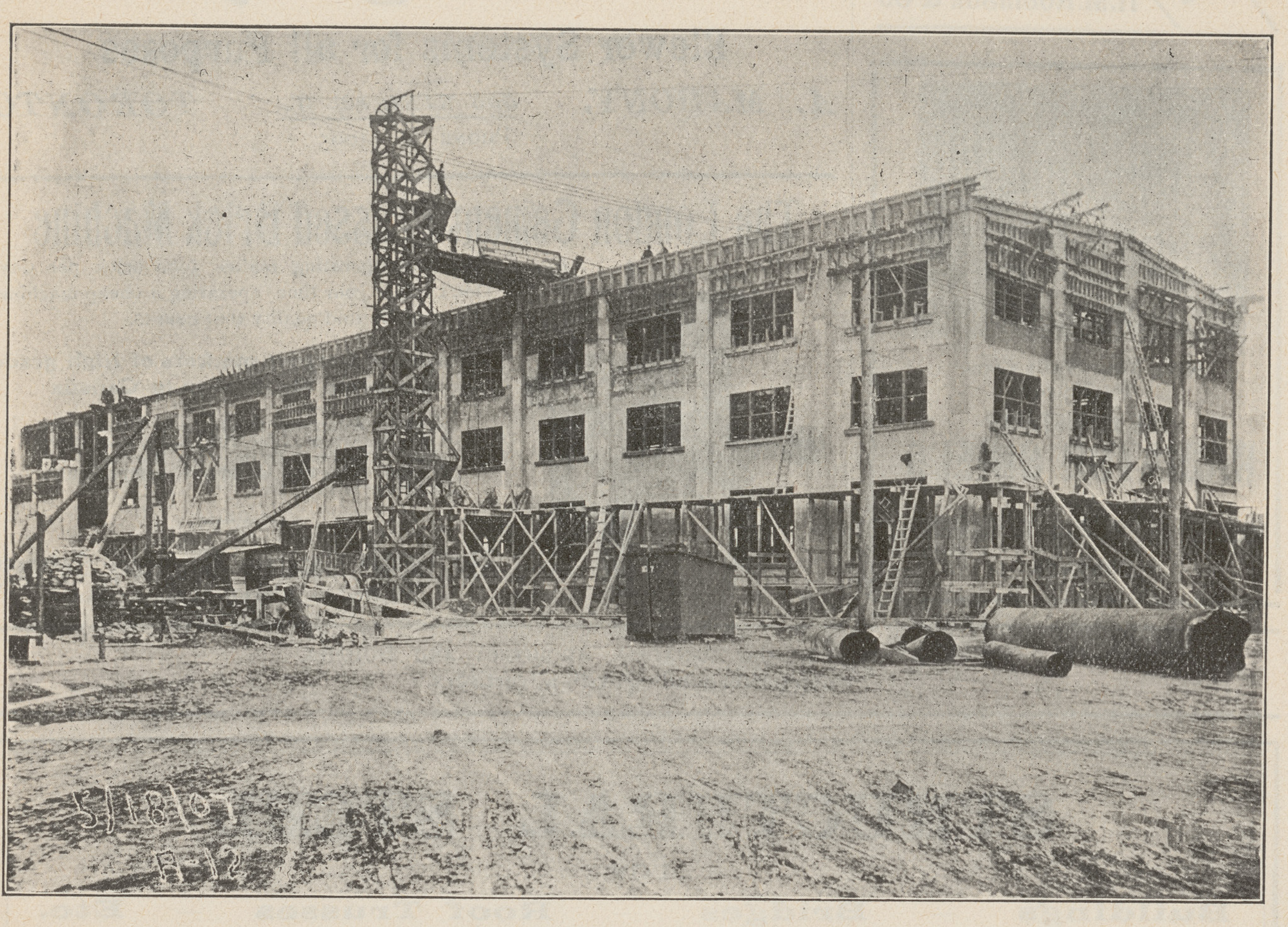

The above picture shows the new works recently constructed of concrete for the Canadian General Electric Company, at Peterborough, Ont. This building from the ground up, as shown, represents thirty-four working days of concreting. The result furnishes an object lesson for speed, economy and excellence of workmanship heretofore unattained in Canada.

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NOTES.

It is said that Cape Breton Island possesses the greatest deposits of barytes at present known in the world. They are located in the Lake Ainslee district, Inverness. Three properties are being worked, employing about 120 men, when running full time. A 400 foot bore hole, sunk in exploring for oil, showed the presence of barytes to that depth, and the deposit is practically inexhaustible. The Cape Breton Mining and Prospecting Company have recently acquired a number of properties in the Lake Ainslee district.

Potasimite is a new explosive, perfected in Monterey, Mex., and first used with success upon the construction of a Mexican Central Railroad branch with wonderful results, for it is pronounced safer, cheaper and more powerful than dynamite. Those explosives based upon nitrogen produce a gas that necessitates abandoning closed works, such as mine or tunnel, during the explosion, and the laborers cannot return to work for a long time thereafter, depending upon the facility for carrying off the gas. Potasimite is said to produce no noxious gas, the only precaution necessary in its use being that the workmen get out of the way of the flying particles of blasted rock.

The Canadian Architect and Builder

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OFFICES: CONFEDERATION LIFE BUILDING, TORONTO, CANADA.

VOL XX.—NO. 234. JUNE, 1907.

ILLUSTRATIONS.

CANADIAN ARCHITECT AND BUILDER Competitions:—

1.—For a Small Suburban House.—Design Submitted by "Architecture".

2.—For a Farmhouse.—Design Submitted by "Byzantine".

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

Views of the New Post Office, Mexico.

CONTENTS

Capital to Educate Labor.

No one can deny that at the present moment the difficulties that are constantly arising between employer and employe, not only in Toronto, but throughout the entire country, go to form one of the most vital questions of the day. At this time of year, when building activity should be at its strongest, these labor difficulties make themselves most apparent, and inconvenience, not only the persons directly interested, and the general public as well, but seriously impair the general prosperity of the country.

Who are responsible for the troubles? Ask the capitalist, and he invariably denounces trades unionism as a monster of insatiable appetite, relentless in demand and incapable of comprehending the difficulties of the employer. Trades unionism, on the other hand, recognizes in capital a hard task master, from whom nothing can be secured save through the severest form of pressure.

Neither thoroughly understand the other, and to this phase of the question at the present time much careful thought is being given by the National Association of Manufacturers in the United States. At its recent convention in New York, this Association appointed a committee of thirty-six to consider ways and means of raising $500,000 a year for three years, to be used in a campaign against the labor unions. This is not to be a "corruption fund," the trustees of the association assure the public. "The money will be devoted to a campaign of education solely," one of them declares. "We think," he continues, "that we will be able to open a good many people's eyes to what the many unions really mean. Gompers and his friends have a fund of a million or so. It is time that there was some federated action on the part of employers. We mean to lead off in such action and in the right way."

Following this announcement, a variety of strongly expressed opinions has been handed out by many American papers.

This is just "the wrong way" to grapple with the problem, declares The Wall Street Journal (New York). "Co-operation, not war, should be the program. It were better to adopt the suggestion of Secretary Straus and invite the leaders of organized labor to meet with the manufacturers for joint consultation and action. Organized labor is here to stay, just as organized capital is. Both are proper within certain limitations. The abuse of organization is as bad on the part of labor as it is on the part of capita. Boycotts are as wrong as rebates, or any other method of unfair competition. The thing to do is for organized capital and organized labor to get together on a program of conciliation, and not to make war on each other."

A similar attitude is assumed by the Washington Times. It recalls the experiences of railroad managers two or three decades ago, when they attempted to combat unionism in a manner similar to this campaign of the Manufacturers' Association: "The unions were not destroyed then and will not be destroyed now. The railroad managers solved the problem of their relations with the unions by recognizing them, dealing with them as organizations, making them responsible, encouraging them to place their strongest, ablest, most skilful men in charge of their business. To-day there is no complaint by the railroads against labor organization. Strikes are almost unknown, the men are satisfied and the corporations feel a security that was unknown to them until they had recognized their employes as intelligent, well-intentioned people, who enjoyed the same right to organize that the government has conferred upon corporations."

The New York Times scoffs at the idea of a campaign of education and asks: "How can the Manu-

facturers' Association by the use of its funds hope to inform the public about union methods better than they are kept informed by the newspaper press? There is no necessity to raise or to spend a million and a half dollars, or even one dollar, for a 'campaign of education', upon labor union methods. The federation of labor unions naturally suggests a federation of employers. If that policy were carried out there would be no little danger that the analogy of the vicious 'sympathy strike' might be followed. It would not be consistent, nor would it be sensible, to resort to methods that have been so unsparingly condemned by employers. There are bad unions, just as there are bad corporations, and the good must inevitably suffer from the wickedness of the bad. The mere raising of a fund will not put a stop to the abuses of the boycott, the causeless strike and the violence of 'entertainment committees,' nor will it check the spirit of unreason that possesses so many labor agitators. We know of no better cure for these evils than public opinion, the sense of fairness and justice, that pervades average humanity. Its working is often discouragingly slow, but it is sure to be reasonably effective."

This idea, as expressed by the Times, was dwelt upon in these columns a few weeks ago at the time of the organization of the so-called "Labor Party" in Toronto. It scarcely follows that a federation of employers necessarily involves resorting to methods "that have been so unsparingly condemned by employers." For purposes of self-protection it is high time that Canadian employers get together on some such scheme as has been undertaken by the National Association of Manufacturers. If they hesitate too long they may find themselves ere long confronted by an organization of labor whose compact ranks will prove unassailable. Small combines of employers, or unsatisfactory "understandings" of manufacturers, are not the only methods of opposing trades unionism, and the sooner that fact is recognized in Canada the earlier will the present feeling of uncertainty that pervades the building industry in this country give place to a clearer understanding between employer and employe.

Not long since we received from a large Ontario manufacturer a communication in which appeared the following:

"Labor unions combine and by strikes, boycotts and other means, are constantly endeavoring to force employers to pay certain rates of wages, whether they may be able to do so or not, or whether the wages demanded are reasonable or not; but the public press do not appear to deal with this feature of the so-called 'combines,' although we believe it is one of the principal reasons why manufacturers are practically driven, in many cases, into arriving at some understanding with their competitors in order to enable them to get a living profit upon the goods that they produce. We believe that if many of them did not do this they would very shortly be unable to pay their liabilities.

"We think, in many cases, there are much stronger combines or understandings contrary to the public interests amongst some contractors than almost any other class in the community, with the exception of the labor unions, whom we consider have the strongest combine of all, and while we are not parties to anything of the kind we are very much of the opinion that understandings upon the part of all concerned to maintain reasonable prices that would net a fair profit would really be in the interests of the general public."

The tone of this confession is typical of that of so many Canadian capitalists in speaking of the condition of affairs in this country. Almost invariably labor has been able to gain its ends in the past, not so much because of its superior organization as because of the lack of unity among employers. Whether or not the scheme of the National Association of Manufacturers will be productive of good results time alone can tell. It is in any case a step in the right direction, and shows that some unanimity of feeling and effort is manifesting itself among employers with regard to the important question of dealing with labor.

Canadian Slums

The attention of the Health Committee of Montreal was recently called to the unsatisfactory conditions of certain of the poorer parts of that city. There are several reasons why the problem of housing the poorer classes is a more serious one in Montreal than elsewhere in Canada. It is a port at which during the summer a continual stream of immigrants is being landed. Those who go on to other cities generally have a more or less definite idea of where they wish to go and why, but there remains a class willing enough to merge itself in the first community ready to absorb it. In addition to this, the population is liable to be swelled at certain seasons of the year by a swarm of laborers whose sojourn in the country is temporary, as in the case of Italian harvesters. These people, during their short stay, are crowded into lodgings in a way which nature would not long endure. Besides these difficulties, Montreal is a city old enough to have considerable districts originally well and substantially built, but which, in the course of a century and a half of varying fortunes, have become insalubrious and sometimes ruinous, and the complaint is made that slums of the worst type are being developed. That this calamity has overtaken some of the larger cities of the United States, in a form as virulent as in the case of the oldest cities of Europe, is a circumstance that should put our Canadian municipalities on their guard against these malignant growths. The cause of slums is largely the desire to make property pay, without large initial outlay, but the eventual cost to the community must be disastrous. The preventive of readiest application is a scheme of by-laws aiming at a fair standard of sanitary building and officers of inspection with powers to see that the spirit of such by-laws is not transgressed. A severe application of such a system might result in so large a condemnation of existing methods and conditions that houses for the poor would become too scarce, and it would not pay to build new ones to conform to a high standard of excellence. Architects are sometimes called on to solve the problem of how to accommodate most people in least space. This is, of course, to aggravate and not to solve the difficulty before the community. The question seems rather to offer an opportunity to the builder who can arrive at the cheapest manner of building houses which shall at the same time be good and durable.

SOME SPECIAL FEATURES OF TRADERS BANK BUILDING, TORONTO

In April, 1905, the work of removing the old buildings on the site of the present Traders Bank Building was commenced, and not long afterwards the process of excavation for the immense foundations, necessary for so high a building, was begun. The construction of these was very interesting, as it was found necessary to increase their capacity, owing to the moisture in the ground. Old residents in Toronto say that within their recollection this very property consisted of a morass or swamp, and the engineers were instructed to take the greatest precautions, regardless of expense, to secure for the building an absolutely safe foundation. In consequence, the ground under these footings is loaded to a much lower degree than is demanded by the requirements of the building laws of the city.

The same rule was applied to the entire structure in all its parts, and a very heavy steel frame was designed. This frame, which is supported by thirty-six columns, includes upwards of seventeen hundred tons of steel, every part of which was riveted together under the minute inspection of a permanent engineer, employed for the special purpose. The first section of this steel frame was erected on the 20th day of September, 1905, and carried up at the rate of about two storeys every three weeks, unusually rapid delivery being made by the contractors

The winter of 1905 and 1906 proved to be a very mild one, which allowed the work in all departments to proceed without interruption, and as a consequence the whole building was practically completed ready for occupancy by the first of October, 1906, at which time the first tenants, the Parry Sound Lumber Company, took possession of their offices.

In describing the building briefly it may be said that to obtain a building which would have an imposing and artistic appearance, combined with the greatest amount of usefulness and revenue-producing qualities, the typical American office building style was adopted for the exterior, with details, and general character from the architecture of the French Renaissance. This allowed a simple arrangement of window spacing in that portion of the building where every inch of floor space was required, and the bank premises, being at the base of the building, allowed a very rich treatment of columns and pilasters, giving great dignity and suggestion of strength. An extensive cornice at the fourteenth floor level, with the French mansard roof above, gave the necessary crown to the structure, and with the addition of ornamental belconies a satisfactory effect was obtained.

The materials of the exterior consist of a fine, light-colored limestone, imported from the State of Indiana by Nicholson, Curtis & Vick, of Toronto, in the basement or first storey; then three storeys of terra cotta, exactly matching the limestone in color

MAIN OFFICES AND ROTUNDA, TRADERS BANK BUILDING, TORONTO.

and texture; then the main field of the facade in a pressed brick, also of a grey color to match the stone and terra cotta.

The upper cornice is of copper left natural, and the roof is also of copper, the high railing along the outer edge of the main cornice forms the top of it into a comfortable balcony, from which a splendid view of the city and surroundings is to be obtained; this is entered from the fourteenth floor offices. There is a large, flat surface on the main roof, which is also accessible from the elevators and stairways.

A word should be said descriptive of the foundation work put in for this building. When the bottom was reached for the footings as originally planned at a depth of about fifteen feet below the sidewalk, the architect found that, owing to moisture in the ground, a greater spread would be necessary for the footings, so that the load would be properly distributed and that the pressure at any one point would not be too great. As it was found that some of the columns would be supporting a greater load than 1,000,000 pounds, the footings necessarily became very large in the case of two of the columns. grillages of heavy steel beams were inserted in the concrete mass of footings to take up the tensile strains, and at the north side, where it was found necessary to spread the footings beyond the building line, cantilever beams of reinforced concrete were formed, anchored on the end by the weight of the inner columns and supported by immense piers of reinforced concrete kept just within the north line, a portion of the weight of the columns being thus supported on the overhang of the beams beyond these piers.

Before these foundations were decided upon a test pipe was sunk to a depth of thirty-five feet below the surface to ascertain the nature of the soil, which was found to be of blue clay, and this was after verified by the shafts for the plunger elevator, the stratum under the City of Toronto consisting of blue clay for a depth of fifty feet, then about thirty feet of blue shaley rock, after which a solid blue rock, similar to that found in the Niagara ravine, extending to at least a depth of 200 feet, where the hole for the plunger of No. 4 elevator stopped.

All the concrete footings were capped with large templates of solid gray granite and large, well-set, heavy cast iron shoes, supplied by the Canada Iron & Foundry Company, to which the first section of the steel columns were connected.

The steel frame was erected with a heavy boom derrick placed in the centre of the building and arranged so that the boom swung out in every direction, and steel was lifted from the wagons in Colborne street in bundles, sometimes weighing as much as eight tons, to the floor where it was required.

Throughout the whole of the work there was no mishap of any kind with this derrick, which indicated great care and careful management on the part of Mr. Greenshields, the superintendent of steel erectors, the Hamilton Bridge Works, of Hamilton. The structural steel work in this building was inspected and tested by Messrs. Chambers & Hone, New York, through their representatives, the Canadian Inspection Company, Limited, Montreal, which latter company were also the inspectors on the Yonge Street Branch.

As soon as the steel frame was well under way the contractors commenced to put in forms for the reinforced concrete floor slabs, and two large steam hoists were put in the centre of the building for the purpose of hoisting this material, which was mixed in the basement and sent up and dumped into the forms, where it was tamped down in position. These hoists were afterwards very useful for the carrying up of masons' material. The brickwork followed very closely upon the concrete floor slabs.

The masonry walls of a steel frame building are, of course, supported at each floor by the horizontal beams, but from outward appearance these are supported directly from the foundation

Ahead of the masonry work, and following closely upon the concrete floor slabs, came the steamfitters, plumbers and electricians, with their forest of pipes, as, of course, all of these had to be built in out of sight. This work was performed with great skill and rapidity by W. J. McGuire & Company, and when the other contractors were ready for the plastering, the plumbing and heating and wiring work had been installed and passed.

The plastering, which was also completed within a very short time, was carried through by Dancy Bros. Company, a Toronto sub-contractor, and Toronto workmen, in a manner which reflects credit upon everybody concerned. This brought the work to the point of wood trim, staircases and elevators in the meantime having gone into shape, and here the contractor's greatest difficulty began owing to the immense amount of woodwork involved in the finishing of the 600 odd doors and 500 odd windows, to say nothing of the stretches of base, picture mould and chair rail.

All of the office part of the building is finished in black birch stained down to a mahogany color and rubbed to a soft, even surface; this finished with polished brass hardware, gives the building a very rich and handsome appearance.

The woodwork in the banking room and the ground floor offices is of quarter-cut white oak with a Flemish finish. The above mentioned woodwork was supplied by A. Miles Company, and the brass hardware by the Aikenhead Hardware Company, both of Toronto.

A building of this height is necessarily equipped with a very good elevator plant. Before deciding upon the nature of this plant the most elaborate and up-to-date plants in the United States were visited, and the experience of the owners of buildings having such equipment interviewed, so that, regardless of first cost, the safest possible type of elevator might be obtained and at the same time cost the least to run and keep in repair. After the most careful consideration the architects and engineers employed unanimously decided that the Otis-Fensom Elevator Company's most improved elevators of the hydraulic plunger type should be installed.

The building is equipped with four high pressure, high speed hydraulic plunger elevators, and the equipment is said to be the finest of the size ever installed.

The elevators, when operating up to specification, will run at a speed of 600 feet a minute.

One of the elevators is so arranged as to handle freight and the effects of the tenants comfortably,

the entire front of the car being arranged to open, and the carrying of an extra load being provided for.

These elevators are equipped with an electric signal device, which was found to be the most serviceable for intelligent operators.

The cars are large enough to carry twenty people, but the rule of the building requires that not more than twelve shall be allowed in one car at a time. The operation of the elevators is directed by a man who stands in the entrance hall and starts each car at its proper time, thus preventing all of the cars being in one place at any time, arranging so that there will always be some of the cars in the upper part of the building and some in the lower part

Enclosures for these elevators are of a very handsome design of wrought iron, finished in an antique bronze, and corresponding with the main staircase.

The staircase from the ground to the fourth floor is entirely of iron, with white marble treads and risers, the top member of the railing being of polished brass. The staircase from the fourth floor to the sixteenth floor, and continuing up to the roof, is entirely of iron, with heavy black slate treads This staircase continues around a well about five feet by ten feet in size. In looking down this well one gets the best idea of the immense size of the structure. The halls and corridors are finished in green and white marble, supplied by the Hoidge Marble Company, Toronto, which impart a charming effect.

The building contains an extensive power plant, which includes three water tube boilers, 150 horse-power each. which were made in England expressly for this building, and two 150 horse-power high pressure vertical engines, with two direct connected 150 kilowatt dynamos. This plant is placed in such a way that there can be no possibility of vibration in the building, and is placed in a handsome engine room at the south side of the building, the walls and floors of which are of a light colored tile.

These, with the elaborate pumping plant for the elevators, the 9,000 gallon elevator pressure tanks and equipment for house pumps, etc., pretty well fill the basement with machinery.

The banking rooms, the principal motive of the building, and the quarters of the head office, as well as the Toronto branch of the Traders Bank of Canada, include the whole of the first and second floors of the building.

These rooms are approached from the street by a broad flight of white marble steps, protected by a very handsome balustrade of Istrian marble,. highly polished. The floors of the public portion of the premises are of selected marbles in white, grey and dull red colors, in handsome geometrical patterns.

The supporting pillars, of which there are twelve, are of Ionic design, made to represent highly polished Breche Voilette marble, with heavy polished bronze bases and caps. These columns are about twenty-three feet in height and support a heavily coffered and enriched ceiling with elaborate cornices. The pilasters opposite these columns on the walls are of the same marble. The walls of the rooms are lined throughout with Pavanazzo marble.

Between these twelve columns extend the handsome antique bronze counter fronts and grilles, having marble panels below and plate glass, neatly framed in ornamental bronze work, above The counter tops are of polished plate glass. The Toronto manager's office is at the southwest corner, and the space occupied by his staff extends along the south side of the building.

A gallery extends around back of the large columns, providing a space for the head office.

On this floor, also, is the board room, where the Board of Directors hold their meetings, and the incinerator for destroying old notes.

Among the most important features of the bank are the vaults, of which there are three, viz.: The treasury vault and two large book vaults.

The treasury vault is lined with chrome steel three inches thick, and has an outside door of chrome steel nine inches thick, and two inner doors of one and a half inch steel.

The outer door is fitted with a very elaborate series of time locks and is a very handsome piece of workmanship, indeed, so accurate are the joints in this piece of work that the thinnest piece of paper inserted in the jambs prevents the door closing.

A handsome polished steel grille gate is used during business hours in the place of the large outer door, which stands open.

VARIETIES OF DAMP COURSES AND THEIR TREATMENT.

By W. M. Brown, C.E.

(Article written specially for The Canadian Architect and Builder.)

The question of damp courses in building operations is of great importance, especially in localities where the climate is wet and variable. When damp arising from the soil is absorbed into the brick or stone wall of a building it ascends gradually until it penetrates the inner surface, affecting the timber and plaster work, and consequently causing a moist atmosphere in the interior. It may also arise from imperfect joints at window lintels and sills, from unfilled and unpointed joints on the face of the wall, from moisture forced into the walls during heavy rainstorms, and from several other causes.

All building materials with very few exceptions are porous and capable of absorbing and transmitting moisture in large quantity. The two main purposes for which damp preventing devices are adopted in connection with buildings are to prevent the moisture from getting into the walls, and, if any be within the walls, not to hinder its extrusion. The former is accomplished by an absolutely waterproof covering, such as asphalt or tar, or the complete isolation of the wall from any sources of dampness (exceptions, of course, being made here to the moisture which is put into the walls in buildings, and which should be allowed a proper opportunity to dry out). The latter will eventually be accomplished by the perfect ventilation of the walls on all sides.

There are several methods for preventing moisture from entering the cellar walls, which may be divided into, first, applications to the outside of the walls, and, second, constructive devices. The efficiency of the former depends greatly on the care and thoroughness with which they are applied. Of this class we have rock asphalt, tar and cements. The first and second are applied to the wall with a large brush, and should be boiling hot. The coating must be not less than three-eighths of an inch thick, covering every joint, and be carried down to the bottom of the foot-

ings. In order to obtain perfect protection, the wall should have been built as carefully as possible, the joints have been well pointed, the whole have become well dried, and the asphalt or tar applied in two or more coats. These coatings should not stop with the face of the wall, but be carried entirely over the top. Some builders recommend that the asphalt be mixed with linseed oil.

Regarding cement as a preventive against absorption of water, there are differences of opinion. That it is an excellent protective covering, when thoroughly applied, goes without question. It is, however, often fractured by the settlement of the walls, and, being somewhat porous, suffers from the action of frost. In either case, it has no further value as a protective. In order to lay it properly, all the beds and joints of the walls should be raked out at least one-half inch deep. The coating should not be less than one-half inch thick, and should, as far as possible, be applied all at one time. If it is necessary to make a joint, it should be vertical and not horizontal. The last precaution is that the earth must not be filled in against it until the cement has thoroughly set.

A similar protective covering is made of a concrete of one-half lime mortar and one-half good cement (Portland preferred).

Of the constructive devices adopted to guard against dampness, we have first those that are in the wall itself, and which comprise the horizontal damp courses, hollow brick lining and facing and hollow wall. There are several kinds of horizontal damp courses, which are placed at the bottom of the wall, either on top of the footings or a short distance above them. That which is considered the most effective damp course is one of asphalt or tar, applied in coats in the same manner as described for the facing of the walls. A great degree of efficiency is given by laying the course of bricks immediately above the damp course, while the last coat is still hot and soft. When this damp course is set in a stone wall it would be better to lay a course of bricks, and, on this, place the asphalt course, starting the stone course above the latter. A layer of slate set in cement has often been adopted as a damp course. The disadvantage, however, of using this method is because of it being very liable to fracture under uneven pressure.

Sheet lead also is an excellent protective from damp, and has been applied for that purpose for about two centuries. It is precluded from being used for ordinary work because of its cost.

Perforated terra cotta bricks may be also used as an excellent damp course. These are made the same size as the ordinary brick, and can be readily beaded into the wall. A course may be set immediately above the footings, and another at, or near, the top of the wall. The bricks should be laid so that the openings run through the wall, and so allow of ventilation and evaporation of any moisture that might rise in the hollow bricks themselves. The perforated bricks are also used to form a vertical damp course. They may be placed either on the inside or outside of the wall, and may be laid as stretchers, as there is not the same liability to collect and retain moisture as there is in the horizontal course. Headers should be placed at frequent intervals to bond the facing of the body of the wall.

A simple and somewhat inexpensive system of rendering walls absolutely damp proof, and of adding much to their strength and stability, is to build the brick work into two four and one-half inch thicknesses, with a half inch or three-quarter inch cavity kept clear of mortar. Thin boarding is inserted in the cavity as the work advances, the space being afterwards filled with rock asphalt compositions. The compositions answer the double purpose of binding the two thicknesses together, and making the wall impervious to moisture.

In general, damp-proof courses should be six inches or more above the level of the external ground, but, where possible, under the wall plate carrying the joints for the floor. In buildings finished with a parapet wall, a damp-proof course should be inserted just above the flashing of the gutter, so as to prevent the wet which falls upon the top of the parapet from soaking down into the woodwork of the roof and into the walls below.

In some localities courses are formed with slates, set in cement. These are sometimes liable to crack, and thin impervious stones are better. Sometimes vertical damp courses are used, particularly when the ground outside is higher than the wall plate inside, to prevent the damp penetrating through the wall. The damp course is bedded in the wall directly under the wall plate. This prevents the moisture rising and destroying the wood. The vertical damp course acts in a similar manner in excluding the damp through the side of the walls. The joints of brickwork should be raked out to receive this damp course.

There is another method of preventing damp from getting into a wall, and that is by what is known as the "dry area method," which consists of building a dwarf wall all around the building, and leaving a space of two or more feet between the dwarf wall and the walls of the building. The dwarf wall is finished with a brick-on-edge coping, built in cement. The floor of the area is usually covered with cement concrete paving, to prevent the water soaking in.

Hollow or cavity walls should be adopted for external work in damp situations exposed to driving rains. These walls are generally built of brick or stone, having a cavity of two or two and one-half inches. The outer wall should be four and one-half inches, the thicker portion being inside, false headers being used in the outer wall. The thick wall inside will carry the doors and roofs, the woodwork being kept clear of the outer portion, which is liable to be damp. The cavities should be ventilated by air bricks in the external portion at top and bottom, care being taken that no mortar or other drippings get into them. The wall ties, usually of cast or wrought iron. galvanized or well tarred and sanded, should be employed to tie the two walls together, or a tie or bonding brick constructed especially for the purpose may be used. Walls constructed after this manner not only exclude the damp, but the layer of air they contain, being a non-conductor of heat, tends to keep the building warm.

There is another method sometimes adopted, because of its cheapness, and that is to lay common field tiles all around the walls, both inside and outside, and connect them by drain tiles to the sewage system or some low spot where the drainage will be effective.

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers.]

(1) Can you give me any information as to constructing diminished fluted plaster columns?

Answer.—The formation of diminished fluted columns by the use of a running mould is a question of importance to plasterers, and many plans have been introduced for the construction of hinged and spring running moulds and diminished running rules. Running moulds have been made with springs to regulate the diminish in depth, but their action is uncertain, the process besides being very expensive. Another form of running mould has been made by fixing wire, catgut or leather on one end of one of the slippers, and on the upper edge of the stock, so that the slipper, when being forced up the diminished space between the running rules, becomes more angular, or, in other words, the slipper on which one end of the wire is attached is higher up the diminished space than the other slipper, and thus causes the stock to cant forward or be drawn from the upright, thus reducing the depth of the plate. The stock in the case is connected to the slippers, not by hinges, but by a pivot inserted at each slipper, so as to allow the stock to cant forward when pulled by the wire. This form of mould also proved to be too erratic in its working to be of great service. Running moulds, having the stock connected to a slipper at each side by means of two hinges (termed a double-hinged mould), allow the mould to assume an angular or slanting form as it passes up the diminished space, thus forming a diminution in the width of the flute, but it does not form it with a true arc all the way. On the contrary, it assumes an elliptical form, which becomes more and more pronounced as it reaches the top of the shaft. The nearest approach to perfection in running diminished flute is attained by means of a running mould with hinged slippers as described, but having the mould plate and stock cut through the centre of the profile, the two parts being then connected by a hinge. This form of running mould (termed a "triple-hinged mould") allows the mould to collapse in the form of a V on plan, and the slippers to run level or parallel with each other, thus forming each half of the flute alike and at right angles from the centre. Still this has the defect of forming the flute without the necessary decrease in depth. One method of diminishing the depth of the flutes is to make the running rules with a diminish on face, or rather to make them with an increasing thickness towards the top ends, so that the mould, when running up on the increasing thickness, will form a corresponding decreased depth of flute. When running a fluted column by this process the running rules are fixed flush with the face line of the fillets. Only one flute can be run at a time, but twelve may be in hand at the same time. As there are generally twenty-four flutes in a column, twelve rules would be required to keep two plasterers at work. When the first set of flutes are run, the rules are taken off and fixed to run the remaining flutes. When all are run, the returned ends at top and bottom require to be made good. It will be observed that the running rules for this method must be carefully made and fixed to ensure true lines and forms It will be understood that a bed or ground must first be formed as a guide for setting out and fixing the measuring rules on. This is performed with the aid of a diminished floating rule. It will also be evident that the floating rule would be more profitably employed for forming the entire shaft with the flutes, thus dispensing with running rules and hinged moulds. This method of running the flutes is slow and tedious, but the worst part is that the flutes are not true segments, in fact all the methods mentioned are more or less a rule of thumb, uncertain and inaccurate. A knowledge of the rudiments of geometry will prove that the true form of a diminished and swell fluted column cannot be run with a mould, however ingeniously made. This may be proved by cutting a plaster or cardboard disc to the former radius of a single flute, and describing a line round it on a board. This would be the form, when at right angles, the bottom of the shaft would give the flute. Then place the disc in an oblique position (the same as the hinged mould at the top) and project the plans by means of a set square on to the board. It will be seen that the mould would give the flute an elliptical form. It may be further explained by stating that when the mould is square at the base, or at right angles with the vertical running rules, the form of the flute would be a true segment, but when the mould is moved up the diminished space between the rules, it assumes an oblique or slanting position, and gives the flute an elliptical form, which increases and becomes more pronounced as it approaches the necking. It may be said that the pointed or ellipitical defects can be filled in and worked fair with circular hand floats to fit the ever varying widths and depths of the flutes.

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(2) Can you inform me as to "setting ranges" in brickwork?

Answer.—Built-in and close fire ranges are many and varied in description; but there are general rules to be observed in setting them that may be applied to nearly all. Double-oven ranges are the largest, and the American, or self-setting, ranges the smallest. With the latter kind little skill is necessary, while the setting of the former is somewhat difficult. In order to set a range the first necessary operations are to properly level in a hearth or course of brickwork to

take the oven cases, to temporarily place the range in position so as to mark the flues, etc. and to build in beneath each oven case sufficient brickwork to allow a two inch cavity below the oven. It will be found that the heat from the furnace traverses the top of the oven, and is then induced to descend on the outside or end of the range to the front of the check, which is a piece of sheet iron fixed diagonally on the bottom of the oven, and coming from the extreme rear corner to within four inches of the front of the soot door in the face of the bottom of the range, and centrally beneath the oven door. The flue at the end should cover as much surface as possible. It has been described how the flue is formed to the front of the check; it is then allowed to go to the centre of the back at the bottom of the oven, and from that point is taken up in a flue usually nine or ten inches wide and three inches to four inches deep, which ascends vertically to the damper, which is placed at the top of the back coving. The covings are sheets of paneled cast iron that encase the recess above the top plate, the covings, in their turn, being covered with a top plate. They are generally fitted with a plate rack, and should be bedded with mortar against the insides of the jambs and brickwork at the back, which is formed between the flues. The boiler is set on a bench of firebrick built at the back of the ash pan, and is usually arranged with a flue from the bottom of the furnace to the back of the range, and a vertical flue formed in a similar manner to the oven flue up to a damper placed at the top of the back coving. The boiler, which should be of wrought iron, is drilled and tapped for the connecting of the hot water circulation. These are general methods. but special kitchens often require different treatment. In every case care should be taken that there be no sharp turns in the flues, and the top flues should be carried above the dampers in the direction of the chimney flue above.

A Sudbury subscriber writes: "Referring to the article in the May number of THE ARCHITECT AND BUILDER on "Expansion Joints in Concrete Roofing," I should like to know if the horizontal joints are put on in the same way, if, for instance, a slab is six feet square. The joints running with the pitch of the roof would be all right, but I am doubtful if the horizontal joints running across the roof would be as good.

Answer.--Joints may be run in any direction. In fact on large roofs it is necessary to run joints in both directions. Joints should also be made at all fire walls against which concrete roof stops. This should be a half joint and the sheet metal flashed to the brick or concrete wall. Care should be taken to finish each day's work up to one side of the joint complete.

MEASURING FLOORS OF VARIOUS SHAPES.

An association in Baltimore has recently published a standard set of rules for the measurement of floors and walls of various shapes, which in a measure ought to obviate the possibility of mistake by the master painter, plasterer and tile setter in calculating surface areas.

Floor measurements must in every case be taken from the face of the finished wall, and no allowance must be made for the wash or base board. When the area of any space is less than 1 square foot it must be figured as 1 square foot. Every space, panel or recess, regardless of length, should be figured not less than 1 foot in width. No deductions can be made for columns, pilasters, registers, floor slabs or for any other cause, unless each separate space measures at least 2 square feet. The excess over 2 square feet may also be allowed.

Referring to the diagram, the following explanation will be of interest:

A. Length by width.

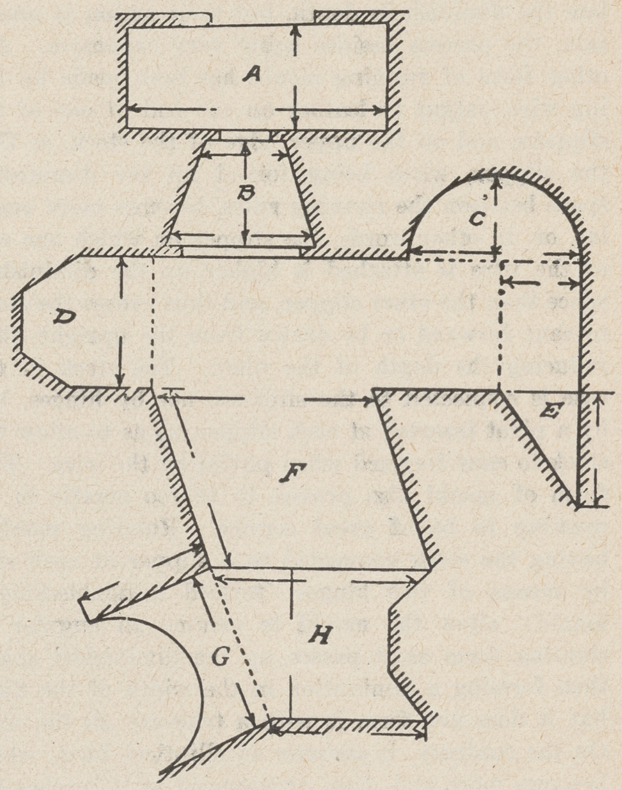
B. Add measure of long side to measure of short side, divide by 2 and add 1 foot. Multiply the result by the length, thus:

8 feet
6 feet
———
2)14 feet
———
7 feet
1 foot
—
8 feet $\times$ 9 feet (depth) = 72 feet.

C. Same as if it were square.

D. Same as if it were square.

E. Square the square portion, square the triangle and deduct from the square of triangle one-third.



Showing Correct Method of Measuring Floors

F. Add 1 foot to width and multiply by length.

G. The same as if it were square.

H. The same as B.

In every case the measurement of the wall is to be taken from the face of the plaster or ground. All spaces less than 6 inches should be figured as 6 inches, and no fraction of a foot should be figured as an additional, excepting 3, 6, 9 or 12 inches, for any one space. No allowances should be made for openings, slabs, registers, windows or other spaces where tiles are omitted in any wall 6 feet high or less, except where the omissions extend from the floor to the entire height of the wainscot, such as a door. When walls are wainscoted more than 6 feet high all omissions above this height can be allowed for.

Again referring to the diagram:

A. Lineal measure omitting doors.

B. Lineal measure omitting doors.

C. Half circle, twice diameter.

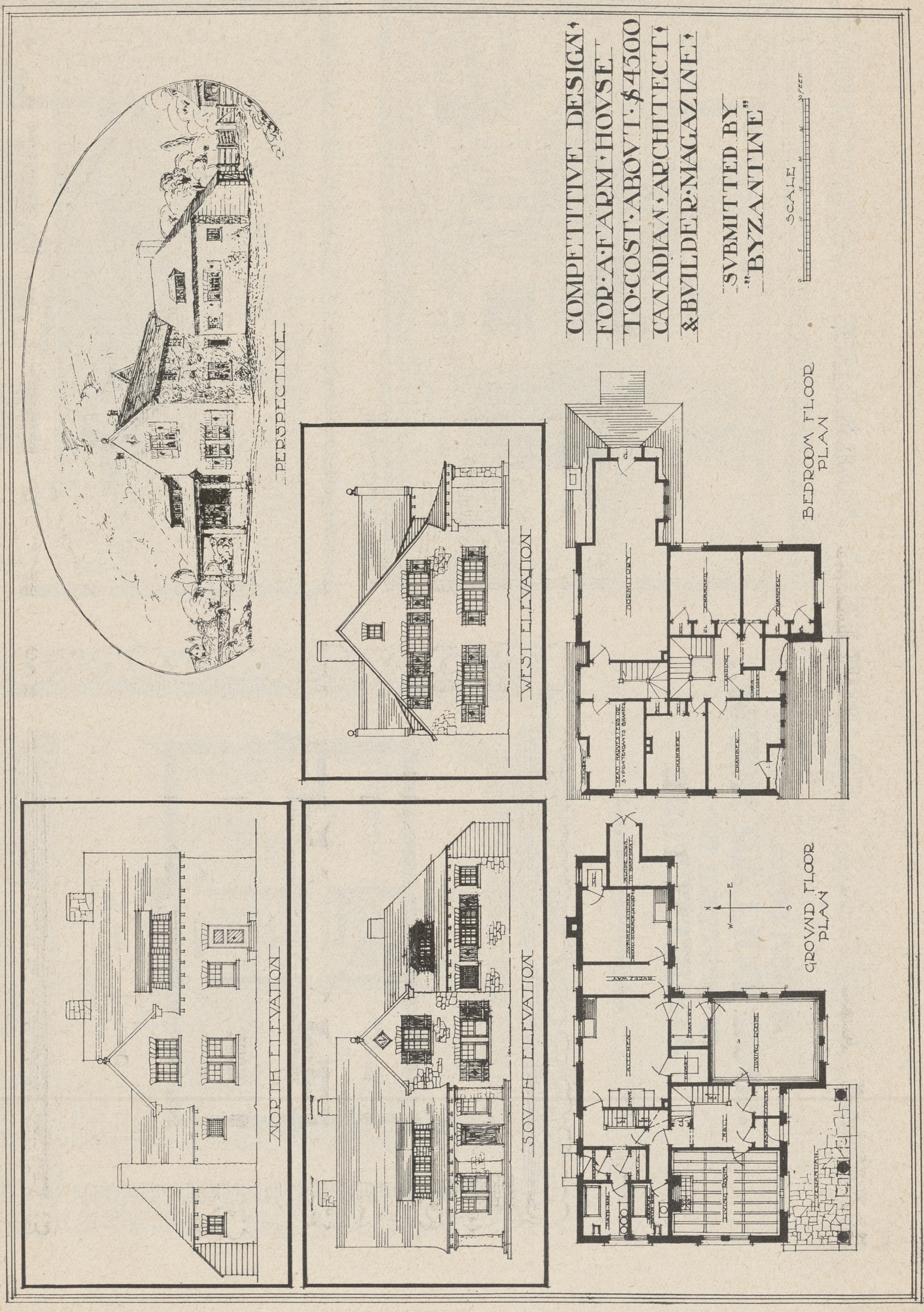
D. Each wall in accordance with straight measurements.

E. Same as D

F. Same as D.

G. Twice the diameter.

H. Same as D.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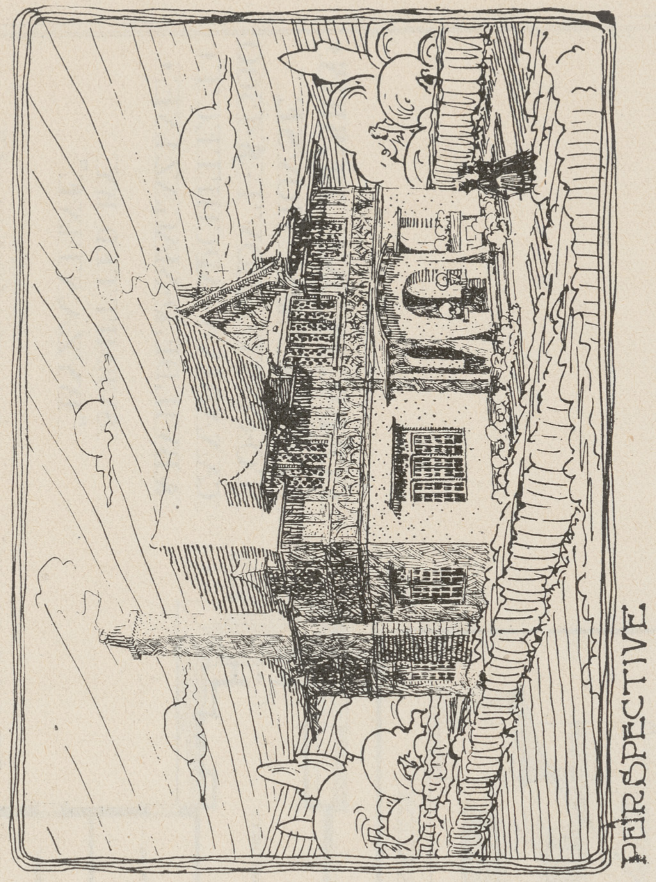
SCALE
PERSPECTIVE
WEST ELEVATION
NORTH ELEVATION
SOUTH ELEVATION
BEDROOM FLOOR PLAN
GROUND FLOOR PLAN

CANADIAN ARCHITECT AND BUILDERS MAGAZINE. COMPETITION.

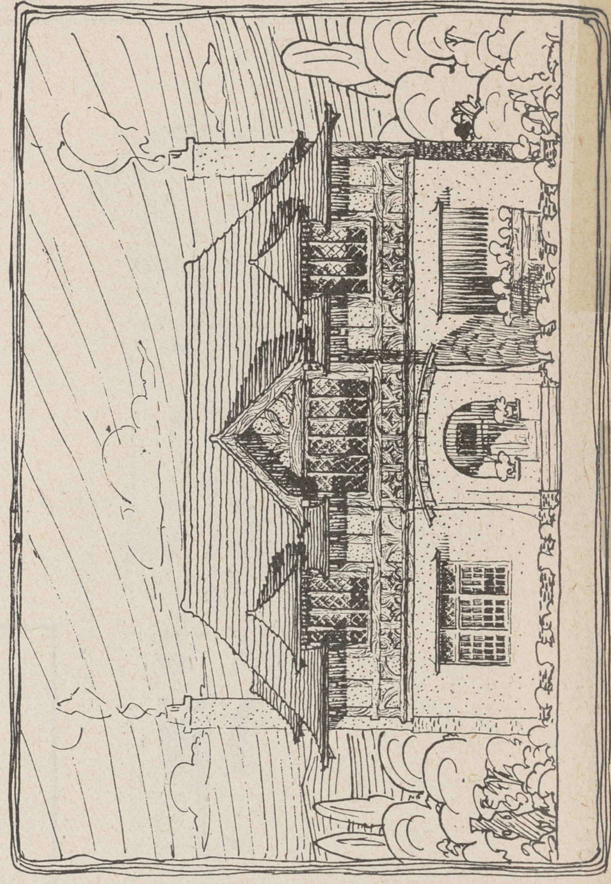
DESIGN FOR A 3000 DOLLAR HOUSE.

SUBMITTED BY ARCHITECTURE

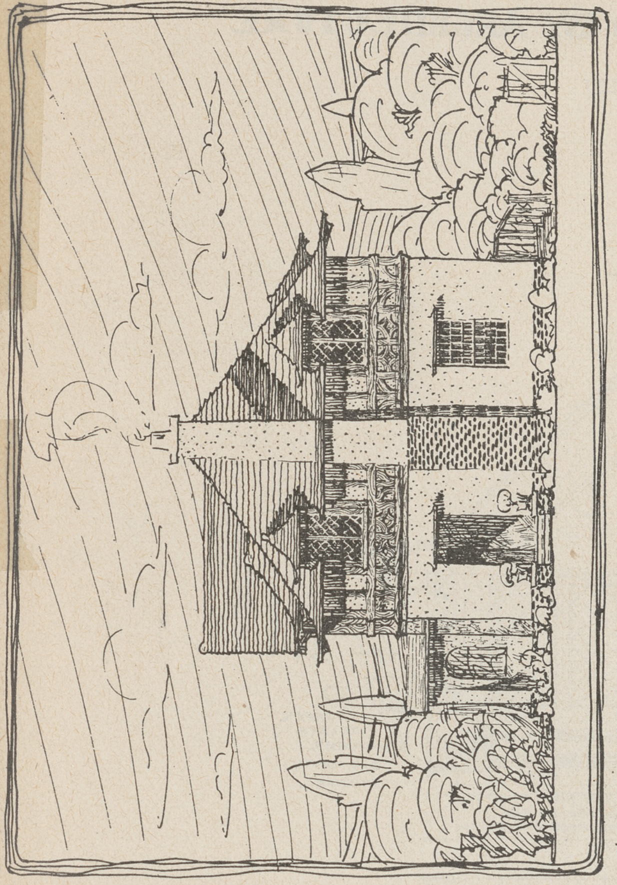
SCALE 1/8" = 1'-0"



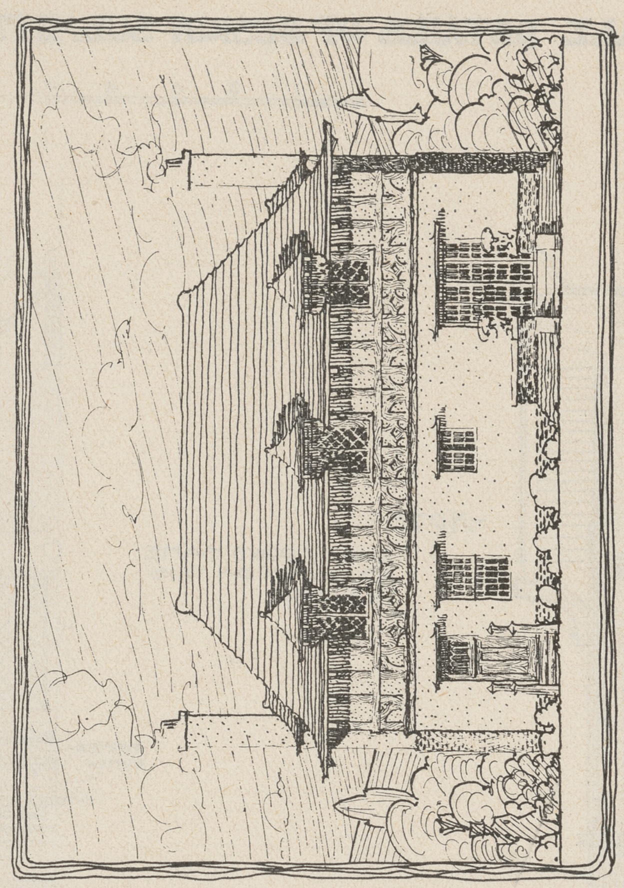
PERSPECTIVE



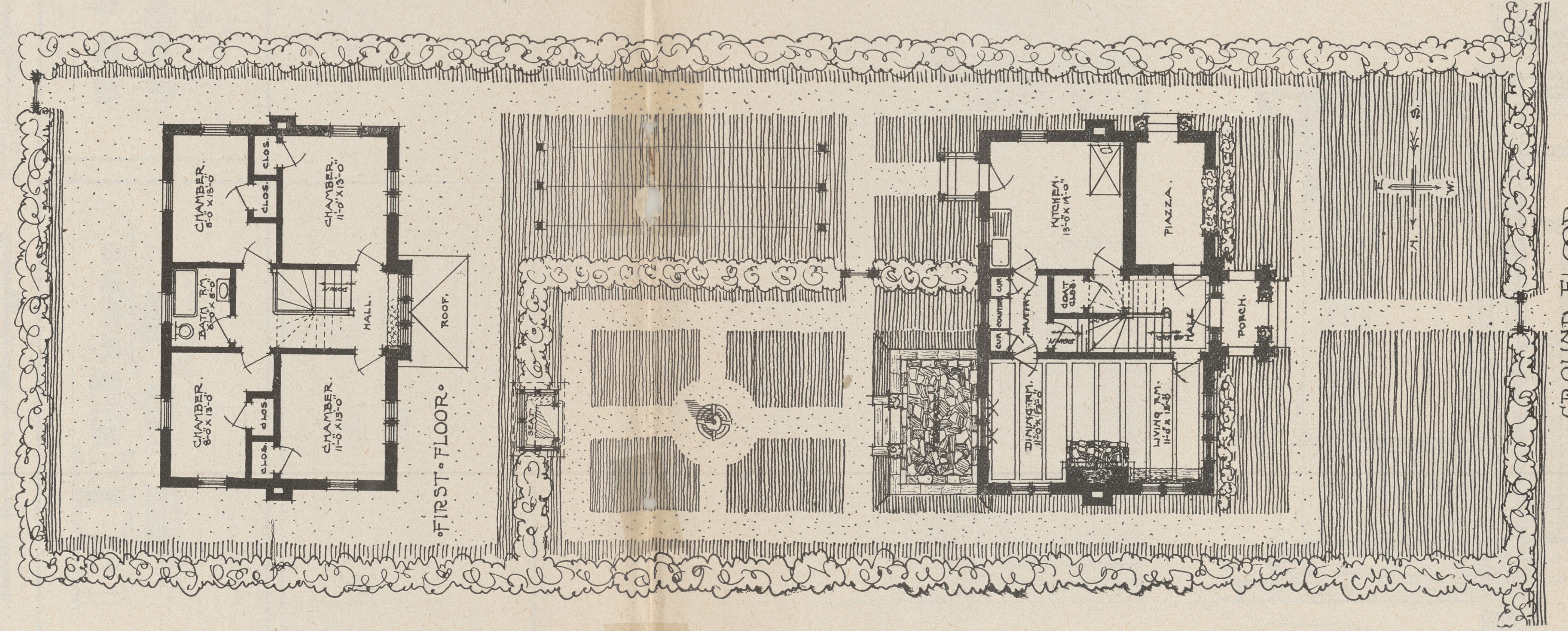
WEST.



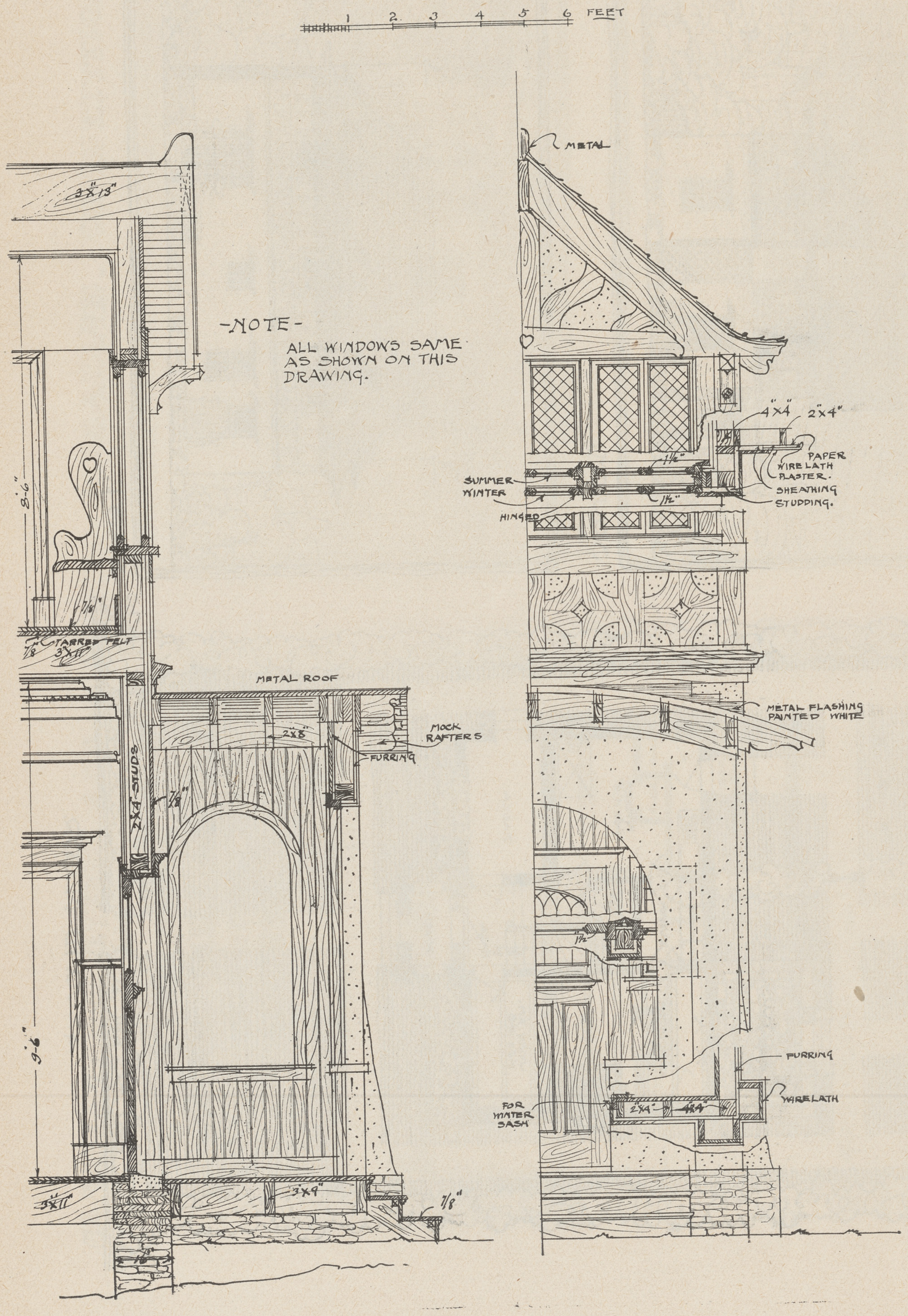
SOUTH.



EAST.



3/4" SCALE DETAILS OF DESIGN SUBMITTED BY ARCHITECTURE



PRACTICAL STAIRBUILDING.

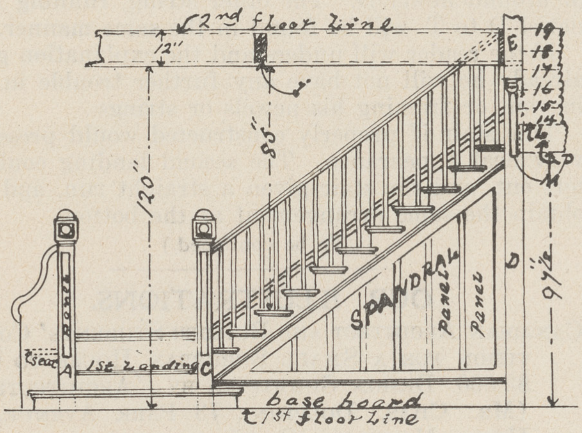
By W. C. A. Stevenson.

(A series of articles written specially for the Canadian Architect and Builder.)

Fourth Article.

In stair-building one feature should always be taken into consideration, especially in the case of front and main stairs in dwellings and public buildings, and that is to make them present a pleasing and inviting appearance. The large square hall affords much better possibilities for laying out a pleasing stair than the narrow hall. However, we present in this article a very desirable style of stair that can be built in an ordinary hall of a width of 5 feet 6 inches or better.

Instead of this stair starting up straight in front of you as you enter the hall from the front door, a nice hall seat greets you. The stair starts, as seen by Fig. 6, with a landing just two risers high, with a bull-nose step for the first and two newels on right and left hand, as seen by A and C, Fig. 6. There is a half newel at B placed at the wall in line with A, and this is all filled in solid below the handrail, either with tongued and grooved stock or for an extra good



ELAVATION

Fig.5.

job it would be panelled. This also forms the back for the hall seat. (It is always proper to place a half newel at the wall whenever the handrail stops against the wall).

We see by Fig. 6 that we have eighteen steps (of course each landing counts for a step). This gives us nineteen risers. It is very essential to have these landings the right height or else it will cause a difference in the rise of each step between them.

As seen by Fig. 5, we have a ten foot ceiling, 120 inches, with 2 inch x 10 inch second floor joists, lath and plaster below and floor above, making 132 inches total rise, which, divided by nineteen risers, gives us, as nearly as can be figured, 6 15-16 inches for each riser. Then the first landing will be just two risers above the floor, 13 7-8 inches. The second landing we see is the fourteenth step, so it will be fourteen multiplied by 6 15-16, which will be 97 1-8 inches. Of course, bear in mind that this is the top of the floor of the landing. In building the framework allow for the floor. These landings are termed quarter space landings, as the stair takes a right angle turn.

Figure 6 shows four newels and the half one at the wall. The newels are all lettered the same in all the figures. The half newel B, also A and C, run to the floor, and the first or bull-nose step fits around them. The newel will be housed out one-half inch to receive the step, so as not to show any joint. Newel D also runs to the floor, as seen by Figure 5. The spandrel is panelled and stops at newel D. The handrail extends up through the well-hole to meet newel D, and the return rail over the steps from second landing to second floor also joins D and connects

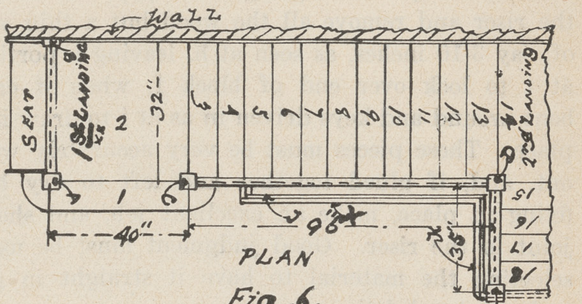


Fig .6.

to newel E. In this case we have to trim the well-hole wider than we did for the dog-leg rail shown in Article 2.

Figure 5 shows the position of the header, plumb over the fifth step, giving us about 85 inches of head room or 120 inches, less the sum of five risers. Figure 6 shows the position of trimmer joist. set so that when the facia board is put on it will just die in behind the newel post, and when the nosing projects over the facia board it will just allow the handrail to pass up through. The face string is cut and mitred and nosing returned, the balusters dovetailed and the wall string housed in the same manner as was explained in Article 2.

Figure 5, L shows the second landing line, the dotted lines 15, 16, 17, 18 and 19 showing the position of each of the four steps and second floor on the flight from second landing to the second floor. M shows the under side of the face string coming down newel E to newel D. The second landing joist P will be supported at the exterior corner by letting it into the newel D for three-quarters of an inch or so. The other side can be secured to the walls. The landing newel E has a turned drop on the bottom, as

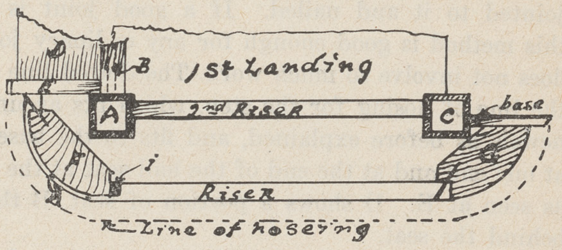


Fig .7.

seen below the ceiling. The soffit of the stairs can be strapped, lathed and plastered, or ceiled with matched material, as desired.

The line K, Figure 6, running from newel E around the well-hole, shows the position of the rail for the balustrade. It can start at E, with a curved or mitred angle and return around the well-hole to wherever desired. More newels would not be necessary, as the balusters would support the rail. They could be housed for one-quarter of an inch or so into the floor or nosing piece at the bottom to make them secure and prevent them from shifting. Of course, the newel E would extend up to the required height, with

the same moulded head as A and C, etc This diagram shows it broken off just above the second floor.

Figure 7 shows the method of getting out the curved riser for the first step, the position of newels A and C and the second riser. The best method is to get a good dry block of sufficient thickness, which would be one riser, less the thickness of the tread, and cut it out as seen at F to the radius of the curve, less whatever thickness you intend to bend around it. Then get a good straight-grained piece of stock for the riser and remove all the wood but a thin veneer of, say 3-16 inches, as seen at h, leaving a portion as at t to lock over end of block f, when it can be bent around and keys driven in as at i to draw it into place. These pieces must be very accurately worked out, and, if glued together and left to dry before fixing in place, make an excellent job, and show no joint in the riser. Good judgment must be used in selecting the material to have it straight in grain, and not too brittle.

Another method which answers for cheaper work is shown at A. The block is simply cut out to the

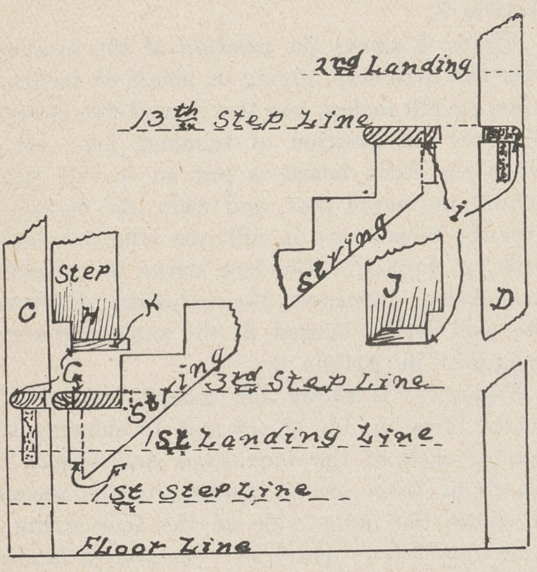


Fig. 8.

shape required and cleaned off smooth, and the riser jointed to it and nailed. If a good joint is made this method is good enough for any ordinary job and does not involve so much work. The dotted line shows the line of nosing for the step, which fits around the newels as before explained, and fits to the baseboard at one end and at the end of the hall seat at the other, as seen at E. D shows a portion of seat, B the rail behind the seat.

Figure 8 shows the method of connecting the face strings to newels. The newel post C is here shown housed out to receive the string and step. It is revolved one-quarter around to enable us to see the side that meets the string. We also see that the first step on this string is really the third step up, so that all that is required to do in laying out the post to be housed is to measure up and find the top of third step, then lay out the step as it comes around the two sides of the post and also the portion of the string that enters it, and house out to the required depth. One thing that must be watched where steps enter the post from all sides, is to be sure you are working to the correct side. A good method is to establish the face side of the post, lay out the bottom step first, then the next, and so on up, going around the post as you go up. E, Figure 8, shows the string cut and ready to enter the post, the dotted line shows the post line; the remaining portion enters the post, thus creating a good seat for the string.

There is no fixed rule as to the depth or amount of wood that shall enter the post. Regarding this the stair-builder may use his own judgment. However, the seat F should be very near the bottom edge of string, especially if the string was not supported below by any wall, as the whole weight would come upon it then. In establishing the post line up string, as shown by the dotted line, the distance from the face of riser coming into the newel to the edge of newel is deducted from the run of one step on string. When post C is turned quarter around and placed in position on the string, the points indicated by G on newel C, step H and string will all come together, the step being cut around newel, as seen at H, when the string and newel can be nailed together. The piece K shows the projection over the string for the nosing and return.

On the post D we see by counting up on elevation, Figure 5, that the thirteenth step meets the newel here, so we just measure up from floor end a distance equal to thirteen risers and house out as shown on D, Figure 8. The top end of the string is also shown here cut to proper shape. When newel D is turned one-quarter around, and placed in position on the string, the point I on step will meet the point I on newel D. At T is also shown the step cut out to fit around newel D. The other string, running from newel D to T, will be found in the same manner.

If the reader will understand the explanation given already he will not have any further trouble in laying out or framing his newels or strings.

This stair if properly constructed would present a very neat appearance. The second landing could be left out, and the stair given a straight run, and still obtain the same arrangement at the bottom.

(To be continued.)

OUR ILLUSTRATIONS.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION FOR A SMALL SUBURBAN HOUSE TO COST $3,000. DESIGN SUBMITTED BY "ARCHITECTURE" (MR. CHAS. DOLPHIN,, 73 PARK AVENUE, ST. HENRI, MONTREAL, QUE.)

House to be stucco and half timber, balloon frame, with basement under entire house except piazza. The lumber of white pine, unless otherwise specified. Dining and living room to have oak floor with oak finish; kitchen, maple floor with pine finish, as also bedrooms and bathroom, the latter having hot water connection with kitchen; hall, oak floor with pine finish. The porch to have hard pine floor, and to be converted into a vestibule in winter. French windows open from dining room to terrace. Doors to be of white pine, the front door of oak veneer. Upper windows to have beaded glass; lower, wood mullions. House to be heated by hot air furnace.

CANADIAN ARCHITECT AND BUILDER STUDENTS' COMPETITION FOR A FARM HOUSE, TO COST ABOUT $4,500. DESIGN SUBMITTED BY "BYZANTINE" (MR. CECIL BURGESS, 230 WOOD AVENUE, MONTREAL.)

Exterior walls to be of field stone, with weathered shingle roof. Living room to have white pine wainscot, about 6 feet high, with plate rail cap, stained for an oak finish. Wainscot to be composed of boards about 10 inches wide, nailed to the wall, with a 3 inch strip planted on to cover joint of boards. Roughcast plaster between joists and above wainscoting. Floor joists over living room to be adzed, joists to form a beamed ceiling. Dining room to have a burlap dado, with wood chair rail. All other rooms to be of pine painted. Floors throughout building to be Carolina pine. Basement floor to be of cement. All exterior trimmings, etc., to be painted chrome green, except doors, windows and shutters, which will be painted a darker green.

HAMILTON HAVING PHENOMENAL BUILDING YEAR.

From all indications Hamilton is to see a phenomenal building year, in spite of strikes and unusual difficulty in procuring building material. Earlier in the season the scarcity of brick threatened to seriously handicap contractors, but that difficulty has since vanished. It is estimated that there will be at least 500 new houses built in Hamilton this year, besides an unprecedented amount of structural alteration. In respect of large and important buildings, Hamilton has had better years, but never before has the amount of general construction run into such figures as will the operations slated for the present season. The building permits for 1907, up to the end of April, totalled $1,984,690, as compared with $1,257,310 for the whole of 1906

A curious feature of the situation is the surprising number of frame dwellings that are this year being erected by the working classes. Contractors also are doing a lot of cheap speculating in this direction, induced thereto by the strong demand for workingmen's houses. One prominent Hamilton architect stated that he had drawn up plans for a frame house costing about $700, and that numerous examples of this class of "shack" were to be seen in the outskirts of the city. The house is built on cedar posts and boarded beneath to encure greater warmth. No cellar, furnace or lighting is furnished, and yet $10 a month is asked for this class of dwelling. If the tenant asks for electric wiring $12 is the rental demanded. The mania for speculation in houses of this class is fostered by reason of the city's seeming disinclination to take up seriously the problem of providing houses for workingmen. Earlier in the season considerable enthusiasm in this direction was manifested by the Board of trade, and plans were secured from Messrs. Stewart and Witton, which, however, have since been temporarily shelved.

The great demand in Hamilton at the present time seems to be for medium priced and centrally located houses. So far but little has been done to meet this demand, and people are living on the outskirts of the city, on the mountain, or in Dundas and neighboring towns, and are dependent upon a precarious street railway service for reaching their daily work.

The new terminal station being constructed by the Cataract Power, Light & Traction Company on King street east is attracting considerable attention in Hamilton, and promises to relieve in no small measure the rather untidy appearance of that section of one of Hamilton's principal streets. The new station, into which will be carried all the electric lines now running into the city, has been designed by Chas. Mills, of Hamilton, and is constructed of Indiana limestone over reinforced concrete. The cost of the new station is estimated at $500,000, the Canada White Company being the contractors To the rear of the station, a new vaudeville theatre, known as "The Bennett," is being constructed by E. C. Horn. The structure is of red brick, and promises to add much to the attractiveness of the new pile of buildings.

Messrs. Stewart & Witton have designed the new Armories on James street north, which are now being erected at a cost of $250,000. Red brick with stone trimmings are the materials being used. The same firm have drawn up plans for the Herkimer Baptist Church on Locke street, to cost $23,000. The new structure will be of Gothic architecture, with a Sunday School in the basement. In the line of public buildings, Messrs Stewart & Witton have in hand designs for the Home for Incurables, to be built adjacent to the House of Refuge, at a cost of $30,000; the Isolation Hospital, to cost $75,000, and also a new building in connection with the Home for Consumptives, at a cost of $10,000. In connection with the Sanitarium an infirmary is also being erected from plans drawn up by the same firm at a cost of $5,500, the gift of Mr. J. J. Grafton, of Dundas. Plans for a new school building have also been accepted by the Separate School Board, although the actual work of construction will not commence until next year. Messrs. Stewart & Witton have also in hand numerous dwelling houses, ranging in value from $1,000 to $12,000, the majority of which, however, will cost from $6,000 to $8,000.

One of the finest residences to be put up in Hamilton and vicinity this year will be that of G. D. Smith, M.P., at Winona. Messrs. Munro & Mead have drawn up the plans, which provide for a stone structure to cost $20,000. The same firm have designed extensive additions and alterations to the Hamilton Club Building, at a cost of $35,000. They also have in charge alterations on the Commercial Club Building, to cost $10,000. The same architects have drawn up plans for a Sunday School for Knox Presbyterian Church at Dundas, which will cost $15,000. Dundurn Park is receiving some attention from the city authorities, and Messrs. Munro & Mead have drawn up plans for a new Art Gallery at Dundurn Castle and a new pavilion for the Park. They have also in hand the plans for a new four-roomed High School for Grimsby. The structure will be of stone and cost in the neighborhood of $4,000. The same firm have also designed numerous up-to-date dwelling houses for the city and vicinity.

A two-storey addition to the Westinghouse premises has been designed by Mr. Charles Mills, to cost $50,000. The accommodation will provide for 200 extra men. The firm also are increasing their office building accommodation, and have commenced a three-storey enlargement of their plant. Mr. Mills has also designed alterations to the premises of the Canada Screw Works, Wellington street north, which will cost $125,000. The Landed Banking & Loan Company have also secured from Mr Mills plans for a large reinforced structure to be erected at the corner of Main and James street south. The same architect has planned a new branch of the Bank of British North America for Barton street near Fullerton avenue.

Prominent among the recent additions to Hamilton's commercial strength is the Berlin Machinery & Tool Company, of Beloit, Wisconsin,, who are building an extensive plant east of Lottridge street. Three large factory buildings and several smaller structures are in process of erection and will render possible the employment of 500 men.

Mr. Stewart McPhie has under way a three-storey hotel on King street east, besides a fireproof store and billiard room for Mr. D. Aiken. Mr. McPhie is making a specialty this season of dwelling houses, costing about $2,000, with three or four bedrooms, cellar and complete plumbing. Mr. McPhie has also found an unusual call for cheap frame houses by the working classes.

A new fire station on Sanford avenue north, east of the Britannia ball grounds, has been designed by Mr. W. A. Edwards, and work will shortly be commenced.

Mr. E. B. Patterson is designing a good class of residences this season, a couple of examples of which are in process of construction on Barton street east.

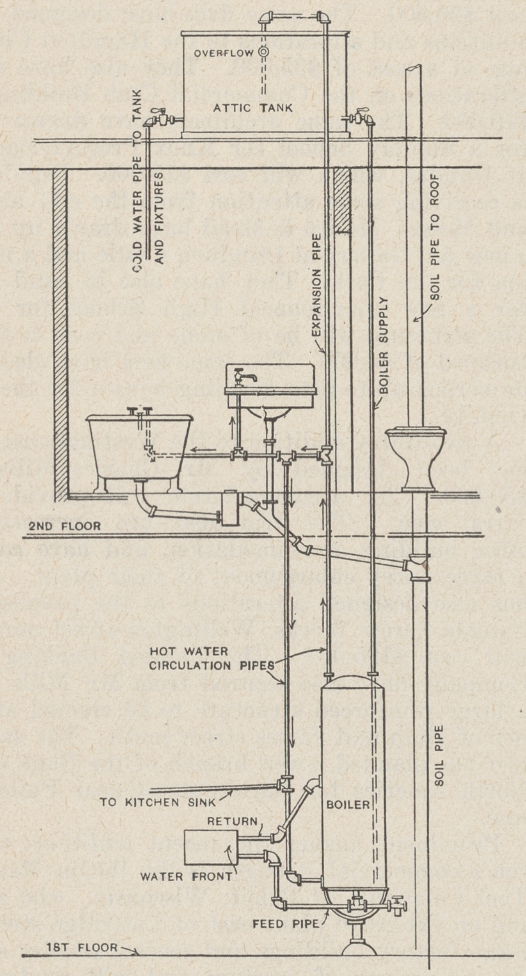
Plans for the new Central Presbyterian Church have been prepared by Mr. John M. Lyle, of Toronto. The structure will be of classic architecture, brick with stone trimmings, and will cost $165,000.

CANADIAN PLUMBER HEATING AND LIGHTING ENGINEER

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers.]

A PROPERLY EQUIPPED BATHROOM.

With a view to educating the public generally, and the farming class in particular, regarding the best and most sanitary plumbing methods, the United States Department of Agriculture has issued a bulletin entitled "Modern Conveniences for the Farm Home," by E.T.Wilson, formerly Assistant Professor of Civil Engineering in the Iowa State College, from



Domestic Hot Water Circulation System.

which we take the following, relative to the proper equipment of the bathroom:

There is a great difference of opinion among those who have made a special study of sanitary plumbing concerning many of the details of construction and design, but the vital things to be kept in mind when laying out the system are to use the best material, isolate all plumbing and concentrate as much as possible. By "best material" is not meant the most expensive, but the most durable. Secure simplicity in all needed fixtures. Avoid complications in waste pipes. Select sinks without grease traps, bathtubs without inaccessible overflows, wash basins free as possible from fouling places, and water closets without valves, connecting rods or machinery.

The drainage system must be so constructed as to carry away completely, automatically and immediately everything that may be delivered into it. It should be constantly and generally vented, frequently and thoroughly flushed, and have each of its openings into the house securely guarded from the entrance of air from the interior of the drain or pipe into the room. All drains, soil pipe and waste pipe should be absolutely tight against the leakage of water or air.

The main line of the house drainage system begins at the sewer, flush or septic tank, as the case may be, passes through the house by such a course as may be indicated by a judicious compromise between directness and convenience, past the location of the highest fixture that is to discharge into it, and then out through the roof for free ventilation. If possible, have the fixtures which are located on different floors in a direct line one above the other to avoid any considerable horizontal run. If bathrooms or water closets are required in different parts of the house, let each have its own vertical line of soil pipe. All plumbing fixtures on bedroom floors should be confined to bathrooms, and under no circumstances should there be a wash basin or any other opening into any channel which is connected with the drainage system in a sleeping room or in a closet opening into a sleeping room. Each bathroom should have exterior location and at least one window for light and ventilation, but pipes should not be placed against outer walls unless adequately protected against frost. Never have plumbing out of sight; let each pipe be in full view, and each closet, bath or basin be unhidden by any sort of inclosing woodwork. There is quite as much danger from the dirt which is apt to gather around concealed pipes and beneath inclosed sinks, bowls or closets as there is from the admission of sewer gas. The simplest way to prevent the accumulation of dirt is to make it easier to be clean than to be dirty. Therefore keep the plumbing fixtures where there is plenty of light.

The bathroom should be a light, well ventilated room, with every facility for cleanliness. Floors and wainscoting of tile or composite material are most desirable, but painted walls are much less expensive and give excellent results. Tile is undoubtedly the most satisfactory material which can be used for the covering of the floors and walls where it can be afforded. Tile floor with covered base and walls finished with cement or hard plaster, painted with enamel paint, are much cheaper. When a tile floor cannot be had, linoleum is an excellent substitute, as it is practically impervious to water. It should be laid before the fixtures are set, in order that there may be no joints. Cement mixed with small chips of marble well rubbed down after setting makes an excellent floor, one that washes as clean as a porcelain plate and has no cracks to harbor dirt; the cost is only about twice that of a

double wood floor, or 50 cents per square foot, including the necessary cement bed on which it is laid.

When it is desired to lay a cement, composition or tile floor upon wooden floor joists, proceed as follows: Nail a 2 x 4 to the side of each of the floor joists flush with the bottom. Upon the top of these stretch wire lath, after the joists have first been covered with tarred paper to prevent them absorbing moisture; and upon this lay cinder concrete, made of 1 part Portland cement, 3 parts loose sand, 6 to 8 parts crushed and screened furnace clinkers, filling in to a level at least 2 inches above the tops of the joists. Upon this is placed the floor finishing. Cinder concrete is used because it is so much lighter than that made of stone. When a tile or cement wainscot is too expensive the walls should be painted. Wall paper is not desirable in a bathroom, nor is wood panelling.

THE CHIMNEY FLUE.

Improperly built chimneys have been the means of endless distraction to householder and plumber alike. The location of the chimney flue is not of material consequence, although for convenience in installing the system it is well to arrange for it near the centre of the building. Of greater importance, however, are the character and size of the flue. The draft in a chimney flue is spiral. This is doubtless due to the pressure of the atmosphere and the friction caused by the draft in overcoming this pressure. For this reason a tile flue, 12 inches in diameter, with an area of approximately 113 square inches, is just as effective as a 12 x 12 inch tile flue with an area of 144 square inches, and because of this fact a chimney flue should be built round, or square, or as nearly square as possible.

There must be a sufficient air supply through the grate of the heating apparatus to properly burn the coal, and the chimney should be of sufficient area to pass the residue of this air after it has expanded, together with the gases of the products of combustion. The following table of sizes of chimney flues recently appeared in an article by A. G. King in the "Architects' and Builders' Magazine":—

Sq. Ft. Radiation for Steam.	Size of Flue.	Sq. Ft. Radiation for Hot Water.
300 to 400	8 x 8 ins.	300 to 700
450 to 700	8 x 12 ins.	800 to 1,200
700 to 1,200	12 x 12 ins.	1,200 to 2,400
1,200 to 2,400	12 x 16 ins.	2,400 to 3,600
2,400 to 3,500	16 x 16 ins.	3,600 to 5,500
3,500 to 5,000	16 x 20 ins.	5,000 to 8,000

Chimneys 16 x 16 inches and larger should be at least 50 feet high, otherwise a flue of larger area should be used. No chimney flue for the use of a heating apparatus should be less than 8 x 8 inches, and a flue 8 x 12 inches would be safer, even for a small apparatus.

A tile-lined flue is best, but if for any reason this is not practicable, the flue should be smoothly plastered. It should be built straight up, without offsets of any kind, and should extend well up above the roof of the building and above the roofs of any surrounding buildings.

Adding height to a chimney increases the velocity of the draft, but not the effectiveness of the flue; therefore, the test commonly employed of burning paper in a flue, as a test of its efficiency, is a fallacy. Remember, a flue which is too large may be easily regulated, but a flue of too small area cannot be made efficient except by rebuilding

HEATING AND VENTILATING A MODERN HOTEL.

The heating and ventilation equipment of the Hotel St. Regis, New York City, is of unusual interest, says the "Engineering Review," on account of the use of the indirect steam heating system for all public portions and 550 guests' rooms in a building eighteen stories in height, direct radiation having been eliminated in all portions except in the dormitory located upon the eighteenth floor. For this indirect heating service a number of independent blower systems are used with cheese-cloth filter intakes, automatic temperature control on heating stacks and humidifiers for automatic regulation of the moisture carried in the air. The systems are in all cases designed to maintain, in connection with the exhaust ventilation system, a uniform temperature of 70 degrees Fahrenheit in zero weather, in all having exhaust vent connections through register openings or fireplace flues. A feature of the installation is the sub-division of the heat supply to the guests' rooms upon the upper floors into three nearly equal divisions, each of which is supplied by a heating fan on a floor underneath for upward delivery.

The blowers are all three-quarter housed steel plate fans, with top vertical outlets, delivering to overhead lines of duct work, which supply the delivery systems on the floors above. They are located with short connections to the tempering coil casing and all have individual motor drives. The motors are all of direct current type.

DISCOVERING LEAKS IN WATER MAINS.

A new method of locating leaks in water mains has been discovered in Geneva, Switzerland, and is described by Alf. Betant, Engineer and Director of the Waterworks of that city, in La Technique Sanitaire for April. In most soils, except those which are very porous, leaks of any magnitude will show themselves at the surface in the shape of moisture; but this method is claimed to reveal quite small leaks (as little as one-half gallon per minute from a pipe about 16 inches diameter having been detected), and in ground where the surface remains quite dry. The method consists of noticing the appearance of melting snow or frost over a trench, it having been found that when this begins to thaw visibly in the morning the points immediately over the leaks thawed most rapidly. Investigation also showed that the water escaping from the pipes at such times had always a temperature of 41 degrees to 43 degrees F., while the ground surface was about 32 degrees; and the phenomenon was attributed to the heat contributed by the escaping water. It is evident that this method is applicable only when the ground has a light covering of snow or frost and its temperature is raised from well below to slightly above freezing, and is there fore restricted to certain seasons and climates. At Geneva the indications, when observed, were invariably reliable. Thirty-eight leaks were discovered in three days from which a total of 136 gallons a minute or about 200,000 gallons a day, had been leaking; the pipes being from about 24 inches to about 2 1-2 inches in diameter, and the amounts of leakage from each from 1-2 gallon to 30 gallons a minute. Observations for this purpose must be made when the frost or snow begins to thaw, hence generally in the morning; and snow is found to be a more sensitive indicator than frost.

CEMENT AND CONCRETE

[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers]

CONCRETE BLOCKS FOR BUILDING PURPOSES.

In a recent consideration of the properties of the hollow concrete building block, which particularly fit it for residence construction, H. H. Price, the well-known writer on concrete matters, says: "The block is made as large as can conveniently be handled in laying. Thus its volume is equivalent to from 20 to 35 bricks, greatly saving the masons' time, reducing the proportion of mortar joints and facilitating the maintenance of true lines in the wall.

"The form of the concrete block is its most decided advantage, affording an air space which prevents the passage of moisture, which makes a house cool in summer, which cuts off 25 per cent. of the winter's fuel bill, which impedes the passage of sound, and which so promotes ventilation that maximum sanitation ensues.

"The accessibility of materials used in manufacturing the concrete block is a very great point in its favor. There is no place where it is necessary, except for special grades of work, to ship in any other ingredient than Portland cement. No other building material is known to man of which 87 1-2 per cent. of the necessary raw material is universally at hand.

"The strength of the well-made concrete block is so far in excess of any duty likely to be imposed upon it in residence construction that it seems unnecessary to dwell upon this quailty. In most cities ordinances now provide that concrete block walls, with usual percentage of air space, may replace solid brick walls of equal thickness, although some have been progressive enough to vary this regulation in favor of the concrete block. As a matter of fact, in no ordinary residence will a twelve inch wall be found inadequate. Well made, properly cured and properly laid blocks may be relied upon to carry a minimum load of 2,500 pounds to the square inch. It will therefore be seen that, where joists are properly hung, the point of greatest danger will be in the floor span rather than in the walls. Of course, good construction will not place a concrete block in tension, as its compressive strength is about ten times its tensile strength. Hence a transverse strain or eccentric loading demands a distribution of the load by the introduction of reinforced concrete members.

"The term fireproof is greatly abused and is often applied to a material which is merely non-combustible. A fireproof building must be not only non-combustible, it must be fire-resistant, it must be so constructed that its contents will be protected from excessive heat. It is in this respect that the concrete block stands foremost among fireproofing materials. Concrete being of itself a non-conductor, and its conductivity being decreased by dehydration of the outer quarter of an inch at a temperature of 1,000 degrees F., its efficacy in a fierce conflagration is enhanced by the air space in the wall, which effectually prevents the transmission of heat to the interior. In actual fires it has been noted that the hand could be comfortably held against the interior of a concrete block wall while flames from an adjoining burning building were beating against the exterior."

Regarding the selection of materials, the writer is insistent that only the best should be employed, and that the gradation of aggregates and the proper proportioning of materials to eliminate voids and secure maximum strength and density with the maximum saving in cement, should receive much greater consideration than is usually accorded.

"To manipulation in mixing too much attention cannot be given. In many of the smaller plants mixing is still done by hand, because of the expense of purchasing and operating a good power mixer.

"In the curing of blocks great progress has been made, and the day is no more when blocks were allowed to lie exposed to sun and wind until they dried. When curing is by sprinkling, the common practice of the present day is to cover the blocks with hay, straw, burlap, or some other moisture-retaining material. The result is not only blocks of far greater strength and soundness than in the early days, but blocks of more uniform color, greater freedom from map or crazing cracks, and an almost entire absence of that white efflorescence which was formerly the cause of so much vexation. Many of the more progressive block makers are curing by steam. Of course it has long been known that blocks placed in a cylinder under steam pressure cured with great rapidity, but to-day numerous plants are curing in sheds lined with tar paper, the blocks being stacked in these sheds and steam turned in for 24 hours with excellent results, both as to saving in time and as to color and hardness of the finished product. Especially are the steam sheds advantageous in the north, as they enable the manufacturer to continue operations throughout the winter."

DANGER IN DECAY OF CONCRETE.

Are our structures of armored or reinforced concrete, now so popular as a building material, likely to be permanent? It has been assumed hitherto, and no facts to the contrary have been adduced, that the concrete envelope protects the iron rods or bats embedded in it, so that there is no danger of rust. Recent experiments, however, show that, where there are electric currents in the vicinity, corrosion may take place within the concrete very quickly. The latest tests are those made by A. A. Knudson, of New York, and reported a few weeks ago to the American Institute of Electrical Engineers. The experiments were

carried out as follows, as described in The Scientific American (New York, April 13):

"Some blocks of one-to-one Portland cement sand concrete were moulded in a common metal water pail, with a piece of two inch wrought iron pipe placed vertically within the blocks to a depth of about eight inches. When the blocks were three years old, one of them was placed in a tank of sea water, and another in a tank of fresh water, and direct current was fed to the iron pipes in the centre of each block, the negative electrode consisting of a piece of sheet iron placed in the tank. A third block, similar to the other two, was placed in a tank of sea water, but was not subjected to the electric current. After a period of thirty days the last named block was found to be in perfect condition, and the embedded pipe was perfectly bright. But the two other blocks, which had developed cracks during the test, were easily broken open; yellowish deposits were found in the cracks, where the concrete had deteriorated to such a degree that it could be cut easily with a knife; and the pipes were considerably corroded, showing a loss of weight of over two per cent. Similar results were obtained in tests with blocks of standard Rosendale cement, made in the same mould although in this case the blocks were tested thirty days after they had been made."

That these results are of profound significance is asserted by the writer, who is of opinion that they call for careful investigation on the part of concrete engineers, and the provision of special insulation in all cases where embedded steel, or reinforcing material, is liable to attack by stray currents near wet foundations. He concludes:

"The whole subject ofelectrolysis, which, because of the exaggerated use to which it has been put by a sensational press, has not received from technical men the attention which it deserves, should be made the subject of a searching investigation with a view to determining the laws and limits of this form of corrosion."

—THE—

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WOOD FOR WATER PIPES.

The use of wood for water pipes is increasing in the Western States, and is said to present many advantages. Pipes made of bored logs were used long ago, but modern wooden pipe, built of staves and fastened end to end by metallic clips, was introduced in Denver about 1882. Andrew Swickard, writing in The California Journal of Technology, says:—

"Wood pipe is, as a general thing, much cheaper and more economical than riveted steel pipe. Where the pipe is to be subjected to a comparatively high pressure (say 250 feet head or over) it might be cheaper to build of steel. There are so many variable elements due to locality that enter into the cost of pipe that it is difficult to make comparisons. As a general thing, wood pipe is from 30 to 50 per cent. cheaper than riveted steel.

"The interior of a wooden pipe will not deteriorate as does that of an iron pipe. From the standpoint of steady capacity the wood is far superior to iron. Not many careful experiments have been made on the flow in wooden pipe. The results are not materially better thon those obtained by experiments on the flow in new, smooth iron pipe.

"The comparatively early deterioration of two or three existing pipe lines has been used as a premise for arriving at the conclusion that wooden pipe is a failure. Where there is one pipe line that has been a partial failure (there are no absolute failures) there are dozens that are giving the utmost satisfaction. Each partial failure has been due to local causes which might have been avoided if they had been understood. It is well known that iron pipe gives under some conditions the greatest satisfaction, while under others it is very unsatisfactory.

"The use of wood pipe has been greatly extended in recent years. A number of long lines have been built in the East during the past two years. It is even attracting attention in Europe. The use of wooden pipe, on a large scale, was decidedly a Western innovation. After a demonstration of its worth it has found favor with the engineers of the East. At least in one case, wood pipe has been favorably considered by conservative English engineers. This is in connection with a large water project in India."

ARCHITECT'S INVENTION FOR RAILROAD WRECKS.

Mr. G. T. Martin, architect, Smith's Falls, has taken out a patent for an improvement in the construction of railway coaches, by which he claims to lessen the danger of cars piling upwards when a collision occurs. At present the front cars invariably pile up on each other. Mr. Martin claims to have overcome this by having the ends of the cars constructed on a slight level instead of making them perfectly straight, so that when the impact comes the cars will be hurled to right and left and ditched, instead of being piled up.

MASTER PAINTERS AND DECORATORS TO MEET IN LONDON.

The annual convention of the Canadian Association of Master Painters and Decorators will be held in London, July 23rd, 24th and 25th. Mr. E. J. Linnington, of Toronto, will deal with the subject of "Shellac," and having recently made a test of this material, will be able to give some valuable information. "Moral Obligations of the Members of the Association to One Another" will be treated by Mr. James J. O'Hearn, Toronto. Mr. L. Graves will present a paper on "The Successful Painter of the Twentieth Century. Mr. Wm. Davenport, of Hamilton, will discuss the question of "Wax Finish vs. Varnish." One of the important topics of the convention has been assigned to Mr. J. W. Knott, of Toronto, who will deal with "The Master Painter's Relation to the Architect." Mr. Benjamin Goodfellow, of Galt, will contribute a paper on "Paint Shop Pointers." The reports of the Committees on "Apprenticeships" and "Trade Schools" will also probably furnish some very valuable data.

CANADIAN NATIONAL EXHIBITION FOR 1907.

The prize list of the Canadian National Exhibition of Toronto, to be held August 27th to September 7th, is just out. Many changes are made, making it more convenient for reference by exhibitors. The regulations are altered so that all animals exhibited in the live stock sections must be registered in the Canadian Herd Book registers.

The directors have endeavored in every way to protect and encourage Canadian-bred horses, the prizes in the breeding classes of the horse section having been increased over $600. Several new classes have also been added, including the one for strings of ten horses, which is expected to be one of the features of this year's exhibit.

In the speed division the prizes have been increased by $1,000, and a new class has been added, providing for horses that are not fast enough for the "free-for-all," but that are too speedy for the 2.30 classes. The conditions remain the same.

In the cattle section A. T. Gordon, of Combscauseway, Scotland, has consented to judge the Shorthorns, which is the largest class in this section.

The general arrangement throughout the prize list this year is alphabetical, so that the finding of any section is simplified. The aggregate amount of the prizes is $39,000, not including the $3,600 given in the speed department. This is the largest purely agricultural prize list on the American continent.

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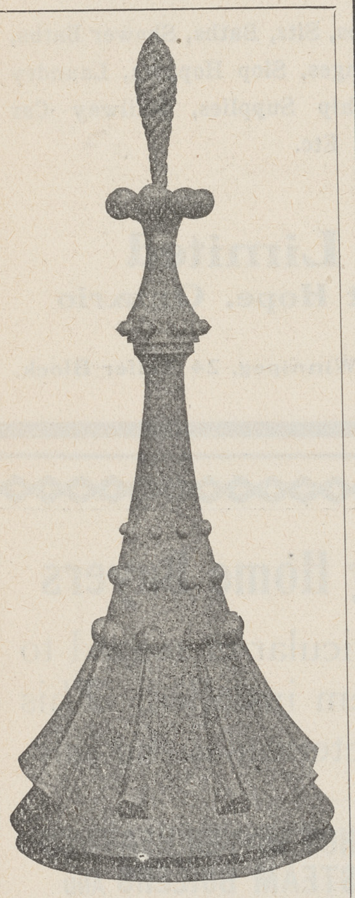

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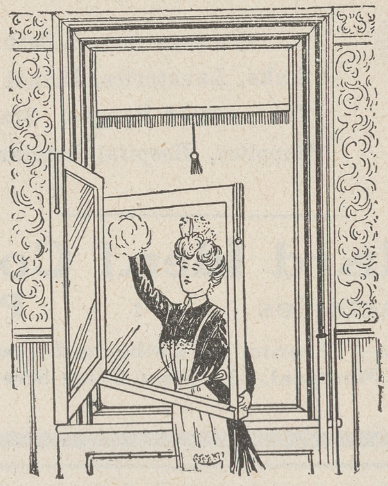

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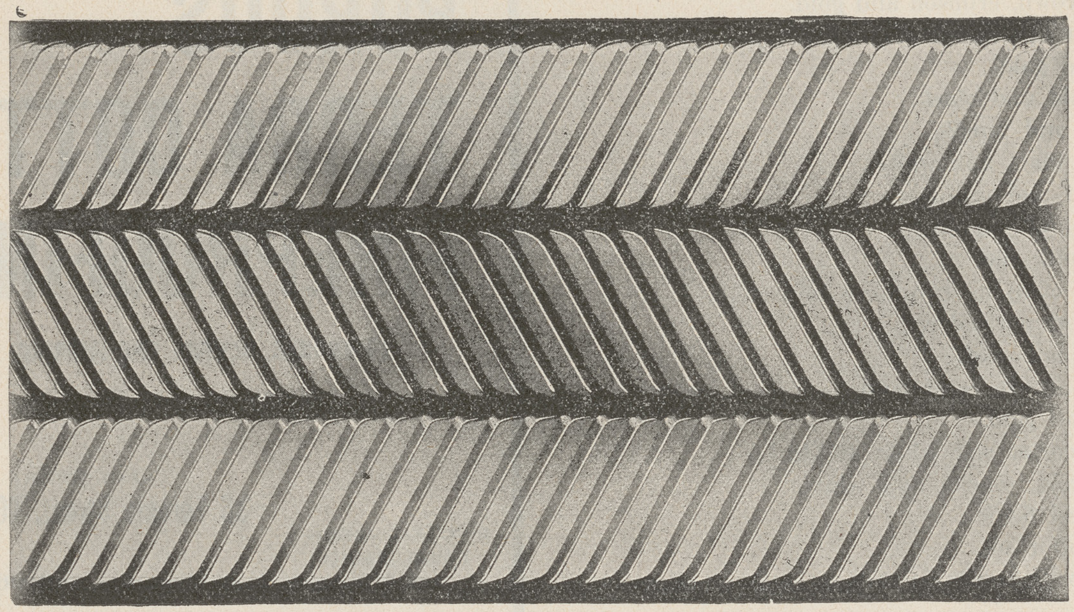

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